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(57)【要約】

【目的】
本発明は、順変換器と、逆変換器と、エネルギ蓄積装置から

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(57)[ABSTRACT OF THE DISCLOSURE]

[PURPOSE]
In the uninterruptible power system formed by carrying out the parallel operation of several

成る単位無停電電源装置を複数台並列運転して成る無停電電源装置において、いずれの単位無停電電源装置が故障しても、その故障機のエネルギ蓄積部を有効に利用することを目的とする。

【構成】

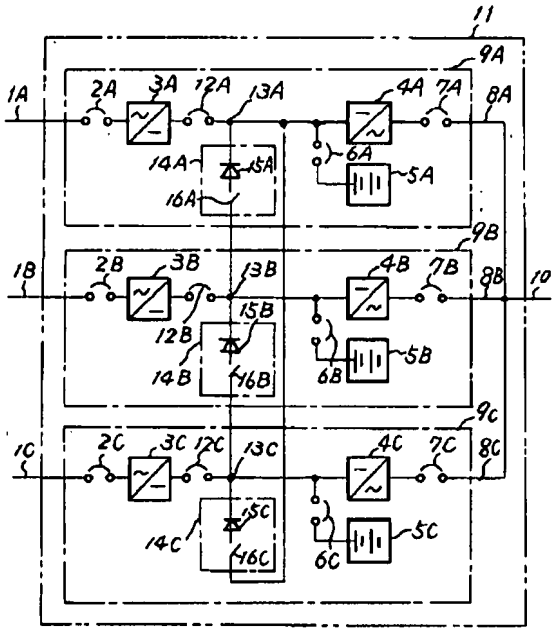
順変換器と、逆変換器と、直流電力を前記逆変換器に供給する直流エネルギ蓄積装置から構成される単位無停電電源装置を複数台並列接続して成る無停電電源装置において、各単位無停電電源装置の順変換器の出力と直流エネルギ蓄積装置用開閉器との間に順変換器出力側開閉器を設け、更に、各単位無停電電源装置の前記順変換出力側開閉器の出力母線間をダイオードと開閉器の直列回路で構成される直流母線間接続回路或いは半導体スイッチング素子を介して連結することを特徴とする無停電電源装置。

units of the unit uninterruptible power system which consists of an electronic power rectifier, an inverse-transformation machine and an energy storage device, even if any of the unit uninterruptible power systems fails, this invention aims at utilizing the energy storage part of the failed machine effectively.

[CONSTITUTION]

In the uninterruptible power system formed by carrying out the parallel connection of several units of the unit uninterruptible power system which consists of an electronic power rectifier, an inverse-transformation machine and a direct_flowing energy storage device that supplies a direct_flowing electric power to said inverse-transformation machine, it prepares the electronic-power-rectifier output side switch between the output of the electronic power rectifier for each unit of an unit uninterruptible power system, and the switch for direct_flowing energy storage devices, furthermore, it connects between the output buses of said rectifying output side switch of an unit uninterruptible power system through the direct_flowing-bus connection circuit which consists of series circuits of a diode and a switch, or through a semi-conductor switching element.

The uninterruptible power system characterized by the above-mentioned.



1A, 1B, 1C: AC input
2A, 2B 2C: Circuit breaker for the AC input
3A, 3B 3C: Electronic power rectifier
4A, 4B, 4C: Inverse-transformation machine
5A, 5B, 5C: Direct flow energy storage device
6A, 6B, 6C: Circuit breaker for direct inflow power
7A, 7B, 7C: Circuit breaker for an alternating-current output
8A, 8B 8C: Unit UPS alternating-current output
9A, 9B, 9C: Unit UPS
10: Uninterruptible power system alternating-current output
11: Yninterruptible power system
12A, 12B, 12C: The electronic-power-rectifier output side switch
13A, 13B, 13C: At least each single is a direct_flowing bus part of UPS
14A, 14B, 14C: Direct_flowing-bus connection circuit
15A, 15B, 15C: Diode
16A, 16B, 16C: Direct_flowing bus indirect continued use switch

【特許請求の範囲】 **[CLAIMS]**

【請求項１】 **[CLAIM 1]**

商用電源から供給される交流を直流に変換する順変換器と、この順変換器の直流出力を入力とし、直流を交流に変換する逆変換器と、前記商用電源の停電時に開閉器を介して直流電力を前記逆変換器に個別に供給する直流エネルギ蓄積装置から構成される単位無停電電源装置を複数台並列接続して成る無停電電源装置において、各単位無停電電源装置の順変換器の出力と直流エネルギ蓄積装置用開閉器との間に順変換器出力側開閉器を設け、更に、各単位無停電電源装置の前記順変換出力側開閉器の出力母線間をダイオードと開閉器の直列回路で構成される直流母線間接続回路或いは半導体スイッチング素子を介して連結することを特徴とする無停電電源装置。

In the uninterruptible power system formed by carrying out the parallel connection of several units of the unit uninterruptible power system which consists of an electronic power rectifier which converts the alternating current supplied from commercial power supply into direct_flowing, an inverse-transformation machine which uses the direct_flowing output of this electronic power rectifier as input and which converts direct_flowing into alternating current, and a direct_flowing energy storage device that individually supplies a direct_flowing electric power to said inverse-transformation machine through a switch at the time of the power failure of said commercial power supply, it prepares the electronic-power-rectifier output side switch between the output of the electronic power rectifier for each unit of an unit uninterruptible power system, and the switch for direct_flowing energy storage devices, furthermore, it connects between the output buses of said rectifying output side switch of an unit uninterruptible power system through the direct_flowing-bus connection circuit which consists of series circuits of a diode and a switch, or through a semi-conductor switching element.
The uninterruptible power system characterized by the above-mentioned.

【発明の詳細な説明】

[DETAILED DESCRIPTION OF THE INVENTION]

【０００１】

[0001]

【産業上の利用分野】
本発明は、個々に蓄電池等の直流エネルギ蓄積装置を備えた単位無停電電源装置を並列接続して構成した無停電電源装置に関する。

[INDUSTRIAL APPLICATION]
This invention relates to the uninterruptible power system which parallel connected and constituted the unit uninterruptible power system which had direct_flowing energy storage devices, such as an accumulator, separately.

【０００２】

[0002]

【従来の技術】
無停電電源装置（以下ＵＰＳと記す）は、コンピュータ等の瞬時的な停電も許されない重要負荷の電源として使用されておりその基本構成の単位ＵＰＳを図３に示する。

[PRIOR ART]
An uninterruptible power system (hereinafter called UPS) is used as power source for essential service which does not allow any momentary power failure of a computer etc., this unit UPS with basic composition is shown in FIG. 3.

【０００３】
図３において、１は商用電源等の交流電源から供給される交流入力、２は交流入力用しゃ断器、６は直流入力用しゃ断器、７は交流出力用しゃ断器、３は交流入力電力を直流電力に変換する順変換器、４は直流電力を交流電力に変換する逆変換器、５は直流エネルギ蓄積装置で一般に蓄電池が使用される。８は交流出力である。この単位ＵＰＳは、通常、２，６，７，のしゃ断器をオン状態にしておき、順変換器３により交流入力１の交流電力を直流電力に変換し、更に逆変換器４により直流電力を交流電力に変換して交流出力８より

[0003]
In FIG. 3, 1 is alternating-current input supplied from AC powers, such as a mains power supply, 2 is a circuit breaker for alternating-current input, 6 is a circuit breaker for direct_flowing input, 7 is a circuit breaker for an alternating-current output, 3 is an electronic power rectifier which transforms an alternating-current input electric power into a direct_flowing electric power, 4 is an inverse-transformation machine which transforms a direct_flowing electric power into an alternating-current electric power, generally an accumulator is used with a direct_flowing energy storage device 5.
8 is an alternating-current output.
This unit UPS is usually 2, 6, and 7, it makes these circuit breakers into the ON state, and

負荷に給電している。

transforms the alternating-current electric power of the alternating-current input 1 into a direct_flowing electric power by the electronic power rectifier 3, furthermore, it transforms a direct_flowing electric power into an alternating-current electric power with the inverse-transformation machine 4, and is supplying electric power to the load from the alternating-current output 8.

【０００４】
交流入力１が停電した場合は、順変換器３の出力電圧が無くなるので、蓄電池５より逆変換器４に直流電力が供給され、逆変換器４からは通常時と同様、交流出力を負荷に無瞬断かつ無停電で供給することができる。図４は、図３の単位ＵＰＳを２台以上の複数台並列接続した従来の無停電電源装置の一実施例を示し、この実施例では、並列台数が３台の場合である。

[0004]
When the alternating-current input 1 fails for power, the output voltage of the electronic power rectifier 3 is eliminated, depend.
A direct_flowing electric power is supplied to the inverse-transformation machine 4 from accumulator 5, from the inverse-transformation machine 4, like usual time, it is uninterruptible and uninterruptable for a load, and can supply an alternating-current output to it.
FIG. 4 shows one Example of the uninterruptible power system of two or more sets of the past which carried out the several-units parallel connection for the unit UPS of FIG. 3, in this Example, it is a case where the number of juxtaposing is three sets.

【０００５】
図４において、９Ａ，９Ｂ，９Ｃは、３台の単位ＵＰＳを示し、９Ａ，９Ｂ，９Ｃ内の各部の名称番号が共通のものは、図３の番号に添字Ａ，Ｂ，Ｃを付して示す。１０は無停電電源装置の交流出力である。蓄電池５Ａ，５Ｂ，５Ｃは各単位ＵＰＳに個

[0005]
In FIG. 4, 9A, 9B, and 9C show three sets of Units UPS, what has a common name number of each part in 9A, 9B, and 9C attaches and shows Subscript A, B, and C to the number of FIG. 3.
10 is an alternating-current output of an uninterruptible power system.
Accumulators 5A, 5B, and 5C are accumulator

別に備えている蓄電池個別方式並列ＵＰＳシステムである。

individual formula juxtaposing UPS systems which individually equip UPS at least with each single.

【０００６】

図４の動作は、各単位ＵＰＳ９Ａ，９Ｂ，９Ｃの個々の動作は、図３の単位ＵＰＳ９の場合と同じである。図４において、３台の単位ＵＰＳ９Ａ，９Ｂ，９Ｃから成る並列ＵＰＳ１１（以下、無停電電源装置とも称す）は、３台の内１台例えば９Ａが故障するとしゃ断器２Ａ，６Ａ，７Ａがトリップし単位ＵＰＳ９Ａは解列される。残りの２台の単位ＵＰＳ９Ｂ，９Ｃにより交流出力１０は維持され、負荷容量を維持しながら給電される。このように単位ＵＰＳが１台解列されて残りの２台で負荷容量を維持できるシステムを並列冗長ＵＰＳと呼ぶ。又、３台の単位ＵＰＳで負荷容量を維持する並列ＵＰＳシステムでは、１台の単位ＵＰＳが故障すると、残り２台の単位ＵＰＳでは負荷容量を維持出来なくなり並列ＵＰＳ１１はシステムダウンする。

[0006]

As for the operation in FIG. 4, the operation of each of the units, UPS 9A, and 9B and 9C, is the same as the case for unit UPS9 in FIG. 3.
In FIG. 4, in the juxtaposing UPS11 (hereinafter called an uninterruptible power system too) which consists of 3 units of unit UPS, 9A, and 9B and 9C, if any of the 3 units, for example, 9A, fails, the circuit breakers 2A, 6A, and 7A will carry out trip and unit UPS9A will be paralleled off.
The alternating-current output 10 is maintained by the remaining two-set UPS units 9B and 9C, electric power is supplied maintaining a load capacity.
Thus, Unit UPS calls the system which is paralleled off one set and can maintain a load capacity by the two remaining sets the parallel redundancy UPS.
Moreover, by the juxtaposing UPS system which maintains a load capacity by three sets of Units UPS, if one set of Unit UPS fails, by remaining two sets of Units UPS, it will become impossible to maintain a load capacity and will carry out the system down of juxtaposing UPS11.

【０００７】

[0007]

【発明が解決しようとする課題】

[PROBLEM TO BE SOLVED BY THE INVENTION]

図４の従来の蓄電池個別方式並

In the accumulator individual formula

列冗長ＵＰＳシステムにおいて、例えば、順変換器３Ａに故障が生じたと仮定すると、２Ａ，６Ａ，７Ａがトリップし、３台のＵＰＳの内単位ＵＰＳ９Ａが解列されて停止する。残りの２台の単位ＵＰＳ９Ｂ，９Ｃにて負荷へ給電が継続される。この状態において、交流入力１Ａ，１Ｂ，１Ｃに停電が発生すると、２台の単位ＵＰＳ９Ｂ，９Ｃは、蓄電池５Ｂ，５Ｃより直流電力の供給を受け蓄電池にて単位ＵＰＳ交流出力８Ｂ，８Ｃを出力し続け、並列冗長ＵＰＳの交流出力１０は無瞬断かつ無停電で給電し続ける。しかしながら、単位ＵＰＳ９Ａは、停電に関係なく、停止状態にあり、順変換器４Ａ、蓄電池５Ａ、は正常であるにも拘らず役務を果せないままの状態にあり、また正常な蓄電池５Ａには、直流エネルギが蓄えられない状態となっているという欠点があった。特に、単位ＵＰＳ９Ａ，９Ｂ，９Ｃの容量が大きくなればなる程、蓄電池５Ａ，５Ｂ，５Ｃの容量も大形化するので、単位ＵＰＳ９Ａの一部の故障によって単位ＵＰＳ９Ａの全体が、役立たなくなるのでは非常に利用率が低く、信頼性が低く、不経済な並列冗長ＵＰＳシステムであるという欠点があった。また通常の並列ＵＰＳシステムでは、１台

parallel-redundancy UPS system of the past of FIG. 4, for example, if it assumes that the failure arose in the electronic power rectifier 3A, 2A, 6A, and 7A will carry out a trip, unit UPS9A is paralleled off among three sets of UPS(s), and it stops.

Power supply is continued to a load in the remaining two-set UPS units 9B and 9C.

In this state, if a power failure occurs to the alternating-current input 1A, 1B, and 1C, two-set UPS units 9B and 9C receive supplies of a direct_flowing electric power from Accumulators 5B and 5C, and output the unit UPS alternating-current outputs 8B and 8C continuously by an accumulator, and the alternating-current output 10 of the parallel redundancy UPS will be uninterruptible and uninterruptable, and will continue supplying electric power.

However, unit UPS9A is in a halt condition regardless of a power failure.

The electronic power rectifier 4A, accumulator 5A stay in a state where they cannot achieve service even if they remain normal.

Moreover, the normal accumulator 5A had the disadvantage of being in the state where a direct_flowing energy is not stored.

The more the capacity of unit UPS9A, and 9B and 9C particularly becomes bigger, the more it also enlarges the capacity of Accumulators 5A, 5B, and 5C, depend.

There was a disadvantage that a utilization factor is very low if the whole unit UPS9A stops being useful with a failure of a part of unit UPS9A, reliability was low, and it was an uneconomical parallel-redundancy UPS

の単位ＵＰＳの順変換器の故障によって、負荷への供給容量不足となりシステムダウンすると言う欠点があった。

system.
Moreover, in the usual juxtaposing UPS system, there was a disadvantage that it became deficient in its supply capacity to load, leading to system down, if the electronic power rectifier of one unit of Unit UPS fails.

【０００８】
本発明は、上記欠点を除去するためになされたものであって、蓄電池個別方式並列ＵＰＳシステムから成る無停電電源装置において、或る単位ＵＰＳの順変換器に故障が発生した場合、他の健全な単位ＵＰＳの順変換器の出力より、故障した単位ＵＰＳの直流母線部へ直流電力を供給し、故障した単位ＵＰＳを、その故障部を除き運転可能とするとともに、直流エネルギ蓄積装置の蓄電池エネルギを供給し続ける様にして部品の有効利用を図った無停電電源装置を提供てすることを目的とする。

[0008]
This invention is made in order to eliminate the above-mentioned disadvantage, comprised such that in the uninterruptible power system which constitutes of an accumulator individual formula juxtaposing UPS system, when a failure occurs in the electronic power rectifier of a certain unit UPS, it supplies a direct_flowing electric power to the broken direct_flowing bus part of Unit UPS from the other output of the healthy electronic power rectifier of Unit UPS, while enabling it to operate the broken unit UPS except for the failure part, it aims at providing the uninterruptible power system which aimed at the effective usage of components as continued supplying the accumulator energy of the direct_flowing energy storage device.

【０００９】

[0009]

【課題を解決するための手段】
本発明は、上記目的を達成するために、商用電源から供給される交流を直流に変換する順変換器と、この順変換器の直流出力を入力とし、直流を交流に変換する逆変換器と、前記商用電源の停電時に開閉器を介して直流電力を前記逆変換器に個別に供

[MEANS TO SOLVE THE PROBLEM]
This invention considers the direct_flowing output of the electronic power rectifier which converts the alternating current supplied from a mains power supply into direct_flowing, and this electronic power rectifier as input, in order to attain the above-mentioned objective, in the uninterruptible power system formed by carrying out the several-units parallel

給する直流エネルギ蓄積装置から構成される単位無停電電源装置を複数台並列接続して成る無停電電源装置において、各単位無停電電源装置の順変換器の出力と直流エネルギ蓄積装置用開閉器との間に順変換器出力側開閉器を設け、更に、各単位無停電電源装置の前記順変換出力側開閉器の出力母線間をダイオードと開閉器の直列回路で構成される直流母線間接続回路或いは半導体スイッチング素子を介して連結するように構成したことを特徴としたものである。

connection of the unit uninterruptible power system which consists of an inverse-transformation machine which converts direct_flowing into alternating current, and a direct_flowing energy storage device which individually supplies a direct_flowing electric power to said inverse-transformation machine through a switch at the time of the power failure of said mains power supply, at least each single prepares the electronic-power-rectifier output side switch between the output of the electronic power rectifier of an uninterruptible power system, and the switch for direct_flowing energy storage devices, furthermore, it constituted so that at least each single might connect between the output buses of said rectifying output side switch of an uninterruptible power system through the direct_flowing-bus connection circuit which consists of series circuits of a diode and a switch, or a semi-conductor switching element.
It was characterized by the above-mentioned.

【００１０】

[0010]

【作用】

前述のように構成することによって、ある単位ＵＰＳの順変換器に故障が発生した時、この故障した単位ＵＰＳの順変換器の入力側の開閉器は、オフされ、直流エネルギ蓄積装置の開閉器はオン状態のまま保たれる。従って、故障した単位ＵＰＳの順変換器の出力電力が無くなると同時に直流電力は、直流エネル

[OPERATION]

When a failure occurs in the electronic power rectifier of a certain unit UPS by constituting as mentioned above, the input-side switch of this broken electronic power rectifier of Unit UPS is turned off, the switch of a direct_flowing energy storage device is maintained with an ON state. Therefore, the unit UPS which the direct_flowing electric power was given to the inverse-transformation machine from the direct_flowing energy storage device, and failed

ギ蓄積装置から逆変換器に与えられ故障した単位ＵＰＳは、正常時と同様に無瞬断で交流電力を出力し続け、並列ＵＰＳの交流出力は、正常時と同様に供給される。次に、故障しない他の健全な単位ＵＰＳを例えば順変換器が故障した単位ＵＰＳのすぐとなりの単位ＵＰＳだとすると、この二台の単位ＵＰＳ間の直流母線間接続回路の開閉器（スイッチ）をオンさせる。そこで直流母線間接続回路のダイオードは、予め健全な単位ＵＰＳの順変換器より直流電力が、故障した単位ＵＰＳの直流母線部へ供給される方向に接続されているので、故障した単位ＵＰＳの順変換器及び直流エネルギ蓄積装置に供給され、直流エネルギ蓄積装置は今まで直流エネルギを放電して順変換器に供給していたが、今度は健全な単位ＵＰＳの順変換器の出力電圧が直流エネルギ放電電圧より高く与えられるため直流エネルギ蓄積装置に直流エネルギが充電される。この状態で、もし万一健全な単位ＵＰＳの直流電圧が順変換器故障の単位ＵＰＳの直流エネルギ蓄積装置の直流電圧より低かった場合、故障単位ＵＰＳの直流エネルギ蓄積装置の直流エネルギが健全な単位ＵＰＳの直流母線部へ放電しようとするが、直流母線間接続回路のダ

while the broken output electric power of the electronic power rectifier of Unit UPS was eliminated is uninterruptible like the time of normal, it continues outputting an alternating-current electric power, and the alternating-current output of juxtaposing UPS is supplied like the time of normal.

Next, it makes the switch (switch) which is the unit UPS in which the electronic power rectifier failed about the other healthy unit UPS which does not fail and which is a direct_flowing-bus connection circuit for two sets of these units UPS supposing it is the next unit UPS immediately switch on.

Then, the diode of the direct_flowing-bus connection circuit is beforehand connected in the direction supplied to the direct_flowing bus part of the unit UPS in which the direct_flowing electric power failed from the electronic power rectifier of the healthy unit UPS, depend.

The broken electronic power rectifier and broken direct_flowing energy storage device of Unit UPS are supplied, the direct_flowing energy storage device discharged the direct_flowing energy until now, and supplied it to the electronic power rectifier.

However, since the output voltage of the electronic power rectifier of the healthy unit UPS is given shortly more highly than a direct_flowing energy discharge voltage, a direct_flowing energy is charged by the direct_flowing energy storage device.

In this state, when the DC voltage of the healthy unit UPS is lower than the DC voltage of the direct_flowing energy storage device of the unit UPS of an electronic-power-rectifier failure, the

イオードがこの放電を阻止する様な方向に接続されているので、故障単位ＵＰＳの直流エネルギ蓄積装置の直流エネルギは放電されることはない。

direct_flowing energy of the direct_flowing energy storage device of the failure unit UPS tends to discharge to the direct_flowing bus part of the healthy unit UPS.
However, it connects in the direction that the diode of a direct_flowing-bus connection circuit blocks this discharge, depend.
The direct_flowing energy of the direct_flowing energy storage device of the failure unit UPS is not discharged.

【００１１】

[0011]

【実施例】
以下、本発明を図面を参照して説明する。

[EXAMPLES]
Hereafter, with reference to drawing, it demonstrates this invention.

【００１２】
図１は、本発明の一実施例を示す構成図で、図中、１２Ａ，１２Ｂ，１２Ｃは各々第１、第２、第３の単位ＵＰＳ９Ａ，９Ｂ，９Ｃの順変換器出力側開閉器、１３Ａ，１３Ｂ，１３Ｃは各々前記１２Ａ，１２Ｂ，１２Ｃの出力の直流母線部、１４Ａ，１４Ｂ，１４Ｃは各々第１、第２、第３の単位ＵＰＳの直流母線部１３Ａ，１３Ｂ，１３Ｃ間を接続する直流母線間接続回路、１５Ａ，１５Ｂ，１５Ｃは各々前記直流母線間接続回路１４Ａ，１４Ｂ，１４Ｃのダイオード、１６ＡＳ，１６Ｂ，１６Ｃは１４Ａ，１４Ｂ，１４Ｃのスイッチである。５Ａ，５Ｂ，５Ｃは

[0012]
FIG. 1 is a block flow diagram showing one Example of this invention, and is 12A and 12B in the figure, 12C is the electronic-power-rectifier output side switch of 1st, 2nd, unit UPS9A of 3rd, and 9B and 9C respectively, 13A, 13B, and 13C are the direct_flowing bus parts of said output of 12A, 12B, and 12C respectively, 14A, 14B, and 14C are 1st, 2nd and the direct_flowing bus part 13A of the unit UPS of 3rd respectively, the diode of said direct_flowing-bus connection circuits 14A, 14B, and 14C, 16AS, and 16B and 16C of 13B, the direct_flowing-bus connection circuit which connects between 13C, and 15A, 15B and 15C are the switches of 14A, 14B, and 14C respectively.
5A, 5B, and 5C are accumulators specifically in a direct_flowing energy storage device and this

直流エネルギ蓄積装置、この実施例では具体的には蓄電池である。次に、前述の構成から成る本発明の動作を説明する。

Example.
Next, it demonstrates an operation of this invention which constitutes of the above-mentioned composition.

【００１３】
今、第１の単位ＵＰＳ９Ａの順変換器３Ａに故障が発生したとすると、交流入力用しゃ断器２Ａと順変換器出力側開閉器１２Ａは通常オンしているが、オフされ、逆変換器出力の交流出力用しゃ断器７Ａ及び直流入力用しゃ断器６Ａは、オン状態のままである。ここで、第１の単位ＵＰＳ９Ａの順変換器３Ａの出力電力が無くなるため、瞬時に蓄電池５Ａより直流電力を逆変換器へ与え、故障した第１の単位ＵＰＳ９Ａは故障部分の順変換器３Ａを除いて、逆変換器４Ａと蓄電池５Ａにより蓄電池運転にて正常時と同様に無瞬断で交流電力を出力し続け、無停電電源装置１１の交流出力１０は、正常時と同様３台のＵＰＳにて並列運転される。

[0013]
Supposing a failure occurs in the electronic power rectifier 3A of 1st unit UPS9A now, it is usually switching on the circuit breaker 2A for alternating-current input, and the electronic-power-rectifier output side switch 12A.
However, it is turned off, the circuit breaker 7A for an alternating-current output of an inverse-transformation machine output and the circuit breaker 6A for direct_flowing input are still ON states.
Here, since the output electric power of the electronic power rectifier 3A of 1st unit UPS9A is eliminated, it gives a direct_flowing electric power to an inverse-transformation machine, and 1st broken unit UPS9A removes the electronic power rectifier 3A of a failure part from Accumulator 5A in an instant, by the inverse-transformation machine 4A and Accumulator 5A, it is uninterruptible like the time of normal, and continues outputting an alternating-current electric power by accumulator operation, and the parallel operation of the alternating-current output 10 of the uninterruptible power system 11 is carried out by three sets of UPS(s) like the time of normal.

【００１４】
次に、各々第２、第３の単位Ｕ

[0014]
Next, the thing made to switch on switch 16A of

ＰＳ９Ｂ，９Ｃが健全で正常運転している場合、第１の単位ＵＰＳ９Ａの直流母線間接続回路１４Ａのスイッチ１６Ａをオンさせることにより、第２の単位ＵＰＳ９Ｂの順変換器３Ｂの出力の直流母線部１３Ｂより直流電力が直流母線間接続回路１４Ａを通って、更に故障した第１の単位ＵＰＳ９Ａの直流母線部１３Ａを経由して、逆変換器４Ａ及び蓄電池５Ａに供給されるので今まで順変換器３Ａが故障していた第１の単位ＵＰＳ９Ａの逆変換器４Ａが蓄電池５Ａにより運転されていたが、健全な第２の単位ＵＰＳ９Ｂの順変換器３Ｂによる正常な順変換器運転となり、蓄電池５Ａは順変換器３Ｂからの直流電力により次の停電や他の順変換器の故障に備えて充電される。この状態で、もし万一、第２の単位ＵＰＳ９Ｂの直流電圧が、第１の単位ＵＰＳ９Ａの蓄電池の直流電圧より低くなっても直流母線間接続回路のダイオードー１５Ａによって、直流電圧差による蓄電池５Ａより第２の単位ＵＰＳ９Ｂの直流母線部１３Ｂに直流電流が流れようとするのをダイオードー１５Ａの機能によって阻止しているので逆流しない。

the direct_flowing-bus connection circuit 14A of 1st unit UPS9A when 2nd, 3rd unit UPS9B and 9C are healthy and are carrying out the normal operation respectively, a direct_flowing electric power passes along the direct_flowing-bus connection circuit 14A from the direct_flowing bus part 13B of the output of the electronic power rectifier 3B of 2nd unit UPS9B, and it goes via the direct_flowing bus part 13A of 1st unit UPS9A which failed further, since the inverse-transformation machine 4A and Accumulator 5A were supplied, the inverse-transformation machine 4A of 1st unit UPS9A with which the electronic power rectifier 3A was out of order until now was operated by Accumulator 5A.
However, it becomes the normal electronic-power-rectifier operation by the electronic power rectifier 3B of 2nd healthy unit UPS9B, accumulator 5A is charged in preparation for the next power failure or a failure of another electronic power rectifier by the direct_flowing electric power from the electronic power rectifier 3B.
Even if the DC voltage of 2nd unit UPS9B becomes lower than the DC voltage of the accumulator of 1st unit UPS9A in this state, it is diode 15A of a direct_flowing-bus connection circuit, since it is blocking that a direct current tends to flow into the direct_flowing bus part 13B of 2nd unit UPS9B from accumulator 5A by a DC-voltage difference by the function of Diode 15A, it does not flow backward.

【００１５】
次に、第１及び第２の単位ＵＰ

[0015]
Next, like a front, when the electronic power

ＳＹＡ及びＹＢの順変換器３Ａ及び３Ｂが故障した場合は、前と同様に、各第１及び第２の単位ＵＰＳの交流入力用しゃ断器２Ａ，２Ｂと順変換器の出力側開閉器１２Ａ，１２Ｂは、通常オンしているがオフされ、交流出力用しゃ断器７Ａ，７Ｂ及び直流入力用しゃ断器６Ａ，６Ｂはオンされたままで、逆変換器４Ａ，４Ｂは、蓄電池５Ａ，５Ｂにより瞬時に蓄電池運転され、正常時と同様に無瞬断にて、交流電力を交流出力８Ａ，８Ｂより出力し続け、無停電電源装置１１の交流出力１０は正常時と同様３台のＵＰＳにて並列運転される。

rectifiers 3A and 3B of 1st and 2nd unit UPS9A and 9B fail, the output side switches 12A and 12B of the circuit breakers 2A and 2B for alternating-current input of each 1st and 2nd unit UPS and an electronic power rectifier are turned off, although usually switched on, while the circuit breakers 7A and 7B for an alternating-current output and the circuit breakers 6A and 6B for direct_flowing input had been switched on, accumulator operation of the inverse-transformation machines 4A and 4B is carried out by Accumulators 5A and 5B in an instant, like the time of normal, it continues outputting an alternating-current electric power from the alternating-current outputs 8A and 8B in a non-hit, and the parallel operation of the alternating-current output 10 of the uninterruptible power system 11 is carried out by three sets of UPS(s) like the time of normal.

【００１６】

更に、第３の単位ＵＰＳが健全で正常運転している場合、直流母線間接続回路１４Ａ，１４Ｂのスイッチ１６Ａ，１６Ｂをオンさせると、第３の単位ＵＰＳ９Ｃの順変換器３Ｃの出力の直流母線部１３Ｃより直流電力が、直流母線間接続回路１４Ｂを通って第２の単位ＵＰＳ９Ｂの逆変換器４Ｂ及び蓄電池５Ｂに供給され、さらに直流母線間接続回路１４Ａを通って、第１の単位ＵＰＳ９Ａの逆変換器４Ａ及び蓄電池５Ａに供給されて、第１及び第２の単位ＵＰＳ

[0016]

Furthermore if switches 16A and 16B of the direct_flowing-bus connection circuits 14A and 14B are turned on when 3rd unit UPS is healthy and is carrying out the normal operation, a direct_flowing electric power is supplied to the inverse-transformation machine 4B and Accumulator 5B of 2nd unit UPS9B through the direct_flowing-bus connection circuit 14B from the direct_flowing bus part 13C of the output of the electronic power rectifier 3C of 3rd unit UPS9C, furthermore, it passes along the direct_flowing-bus connection circuit 14A, and the inverse-transformation machine 4A and Accumulator 5A of 1st unit UPS9A are supplied, the inverse-transformation machines 4A and 4B

の逆変換器４Ａ及び４Ｂは、今までの蓄電池運転から第３の単位ＵＰＳ９Ｃの順変換器３Ｃによる正常な順変換器運転となり蓄電池５Ａ，５Ｂは次の停電に備えて充電される。この状態で、もし万一、第３の単位ＵＰＳの直流電圧が第２及び第３の単位ＵＰＳ９Ｃの蓄電池５Ａ，５Ｂの直流電圧より低くなっても直流母線間接続回路のダイオード１５Ａ，１５Ｂによって、電流電圧差による蓄電池５Ａ，５Ｂから第３の単位ＵＰＳの直流母線部１３Ｃへ直流電流が流れようとするのをダイオード１５Ａ，１５Ｂの機能によって阻止しているので逆流しない。

of the 1st and 2nd unit UPS serve as normal electronic-power-rectifier operation by the electronic power rectifier 3C of 3rd unit UPS9C from old accumulator operation, and Accumulators 5A and 5B are charged in preparation for the next power failure.
Even if the DC voltage of 3rd unit UPS becomes lower than the DC voltage of accumulators 5A and 5B of 2nd and 3rd unit UPS9C in this state, they are diodes 15A and 15B of a direct_flowing-bus connection circuit, since it is blocking that a direct current tends to flow into the direct_flowing bus part 13C of 3rd unit UPS from accumulators 5A and 5B by a current-potential difference by the function of Diodes 15A and 15B, it does not flow backward.

【００１７】
次に、第１、第２及び第３の単位ＵＰＳの順変換器３Ａ，３Ｂ，及び３Ｃの全てが故障した場合は、各単位ＵＰＳの交流入力用しゃ断器２Ａ，２Ｂ，２Ｃ及び順変換器出力側開閉器１２Ａ，１２Ｂ，１２Ｃはオフされ、逆変換器４Ａ，４Ｂ，４Ｃは蓄電池５Ａ，５Ｂ，５Ｃにより、瞬時に蓄電池運転され、正常と同様無瞬断にて交流電力を出力し続け、無停電電源装置１１の交流出力１０は正常時と同様３台のＵＰＳにて並列運転される。
又、各単位ＵＰＳの全ての順変換器３Ａ，３Ｂ，３Ｃが故障し

[0017]
Next, as for the circuit breakers 2A, 2B, and 2C for alternating-current input of UPS, and the electronic-power-rectifier output side switches 12A, 12B, and 12C, at least each single is turned off when all the electronic power rectifiers 3A, 3B, and 3C of the 1st, 2nd and 3rd unit UPS fail, accumulator operation of the inverse-transformation machines 4A, 4B, and 4C is carried out by Accumulators 5A, 5B, and 5C in an instant, it continues outputting an alternating-current electric power in a non-hit similarly, and the parallel operation of the alternating-current output 10 of the uninterruptible power system 11 is carried out to it being normal by three sets of UPS(s) like the time of normal.

ているため正常な順変換器からの直流電力の供給が出来ないので、直流母線間接続回路１４Ａ～１４Ｃは、接続されない。従って、並列ＵＰＳは、各単位ＵＰＳとも、蓄電池運転にて交流出力電力が負荷に供給され、蓄電池が無くなるまで、蓄電池運転が続けられ、その後供給が停止される。

Moreover, since all the electronic power rectifiers 3A, 3B, and 3C of UPS are out of order and at least each single cannot perform supply of the direct_flowing electric power from a normal electronic power rectifier, direct_flowing-bus connection circuit 14 A- 14C is not connected.
Therefore, in juxtaposing UPS, an alternating-current output electric power is supplied to a load by accumulator operation in each unit UPS, accumulator operation is continued until an accumulator runs out, after that, supply is stopped.

【００１８】
尚、本発明の実施例においては、各単位ＵＰＳの順変換器３Ａ，３Ｂ，３Ｃの容量は、従来の実施例に比べ、単位ＵＰＳ３台で全負荷に給電する並列ＵＰＳシステムでは、最大３倍の容量が必要である。また、万一１台の単位ＵＰＳが停止して、残りの２台の単位ＵＰＳで全負荷に給電できる並列冗長ＵＰＳシステムでは、順変換器３Ａ，３Ｂ，３Ｃの容量は従来の実施例に比べ最大４／３倍必要である。

[0018]
In addition, in the Example of this invention, the one of the capacity of the electronic power rectifiers 3A, 3B, and 3C of UPS a maximum of 3 times the capacity of this is required at least for each single in the juxtaposing UPS system which supplies electric power to a full load in three units UPS compared with the Example of the past.
Moreover, one set of Unit UPS should stop, in the parallel-redundancy UPS system which can supply electric power to a full load by two sets of the remaining units UPS, the capacity of the electronic power rectifiers 3A, 3B, and 3C is the a maximum of 4-/triple need compared with the Example of the past.

【００１９】
以上説明のように、前述の実施例によれば、並列ＵＰＳシステムでは、単位ＵＰＳの順変換器の故障が２台まで発生してもシ

[0019]
According to the above-mentioned Example, in a juxtaposing UPS system, it can perform above juxtaposing UPS operation which made reliability improve like description, without

ステムダウンさせることなく信頼性を向上させた並列ＵＰＳ運転が可能である。又、並列冗長ＵＰＳシステムでは、単位ＵＰＳの順変換器の故障が２台まで発生しても、正常時と同様、各単位ＵＰＳの逆変換器には、全負荷の１／３つづの低負荷で並列運転可能であり、蓄電池は３台分利用できるため、蓄電池の保持時間は、従来の蓄電池の２台分利用に比べ長くなり有効利用ができる。

carrying out a system down, even if a failure of the electronic power rectifier of Unit UPS occurs to two sets.
Moreover, even if a failure of the electronic power rectifier of Unit UPS occurs to two sets in a parallel-redundancy UPS system, at least each single is in the inverse-transformation machine of UPS like the time of normal, since a parallel operation can be carried out by low load, one third of full load at a time, and an accumulator can be utilized by three sets, compared with utilization, it gets long the holding time of an accumulator by two bases of the accumulator of the past, and the effective usage of it is possible.

【００２０】
図２に、本発明の他の実施例を示す。図２の１７Ａ，１７Ｂ，１７Ｃはサイリスタ等のような半導体スイッチング素子であり、他の記号のものは図１と同様なものである。この実施例では、直流母線間接続回路１４Ａ．１４Ｂ，１４Ｃの構成をサイリスタ等のような半導体スイッチング素子で構成したものである。

[0020]
The other Example of this invention is shown in FIG. 2.
17A, 17B, and 17C of FIG. 2 are semi-conductor switching elements, such as a thyristor.
The thing of another symbol is the same as that of FIG. 1.
Semi-conductor switching elements, such as a thyristor, constituted the composition of direct_flowing-bus connection circuit 14A.14B and 14C from this Example.

【００２１】

[0021]

【発明の効果】
以上説明のように、本発明の無停電電源装置によれば、下記の効果を得ることができる。

[ADVANTAGE OF THE INVENTION]
According to the uninterruptible power system of this invention, it can acquire the following effect like description above.

【００２２】
(1) 従来、並列ＵＰＳシステム或いは並列冗長ＵＰＳシステムにおいて、或単位ＵＰＳの順変換器の故障があっても、故障機の単位ＵＰＳを停止解列することなく、故障機の逆変換器を当該故障機の直流ネルギ蓄積装置の蓄電池による蓄電池運転及び他の健全な単位ＵＰＳの順変換器より、当該故障機の逆変換器に電力を供給できるので、正常な単位ＵＰＳと同様に故障機も順変換器運転も可能となり信頼性の高い無停電電源装置を提供でき、又、故障した単位ＵＰＳの残った正常部分の逆変換器や直流エネルギ蓄積装置の蓄電池等の有効利用が可能である。
(2) 直流エネルギ蓄積装置の蓄電池等が全台数使用できるので、停電時の保持時間は従来より長く出来、有効である。

【図面の簡単な説明】

【図１】
本発明の無停電電源装置の一実

[0022]
(1) Formerly set to juxtaposing UPS system or parallel-redundancy UPS system, it can supply an electric power to the inverse-transformation machine of said failure machine from the electronic power rectifier of accumulator operation according the inverse-transformation machine of a failure machine to the accumulator of the direct_flowing energy storage device of said failure machine, and the other healthy unit UPS, without carrying out the stop paralleling-off of the unit UPS of a failure machine, even if there is a failure of the electronic power rectifier of certain unit UPS, depend.
It can perform the effective usage of the inverse-transformation machine of a normal part, the accumulator of a direct_flowing energy storage device, etc. in which the unit UPS which it came to be able to perform failure machine and electronic-power-rectifier operation as well as the normal unit UPS, and could offer the uninterruptible power system with high reliability, and failed remained.
(2) It can carry out all the number use of the accumulator of direct_flowing energy storage device etc., depend.
Holding time at the time of a power failure is made for a long time conventionally, it is effective.

[BRIEF DESCRIPTION OF THE DRAWINGS]

[FIG. 1]
The block flow diagram showing one Example

施例を示す構成図。

of the uninterruptible power system of this invention.

【図２】
本発明の他の実施例の無停電電源装置を示す構成図。

[FIG. 2]
The block flow diagram showing the uninterruptible power system of the other Example of this invention.

【図３】
単位無停電電源装置の基本構成図。

[FIG. 3]
The basic-composition figure of a unit uninterruptible power system.

【図４】
従来の無停電電源装置の一例を示す構成図。

[FIG. 4]
The block flow diagram showing an example of the uninterruptible power system of the past.

【符号の説明】

[DESCRIPTION OF SYMBOLS]

１，１Ａ，１Ｂ，１Ｃ…交流入力
２，２Ａ，２Ｂ，２Ｃ…交流入力用しゃ断器
３，３Ａ，３Ｂ，３Ｃ…順変換器

1, 1A, 1B, 1C... AC input
2,2A, and 2B and 2C... circuit breaker for the AC input
3,3A, and 3B and 3C... electronic power rectifier

４，４Ａ，４Ｂ，４Ｃ…逆変換器
５，５Ａ，５Ｂ，５Ｃ…直流エネルギ蓄積装置
６，６Ａ，６Ｂ，６Ｃ…直流入力用しゃ断器
７，７Ａ，７Ｂ，７Ｃ…交流出力用しゃ断器

4,4A, 4B, 4C... Inverse-transformation machine
5,5A, 5B, 5C... Direct flow energy storage device
6,6A, 6B, 6C... Circuit breaker for direct inflow power
7, 7A, 7B, 7C... Circuit breaker for an alternating-current output

８，８Ａ，８Ｂ，８Ｃ…単位ＵＰＳ交流出力
９，９Ａ，９Ｂ，９Ｃ

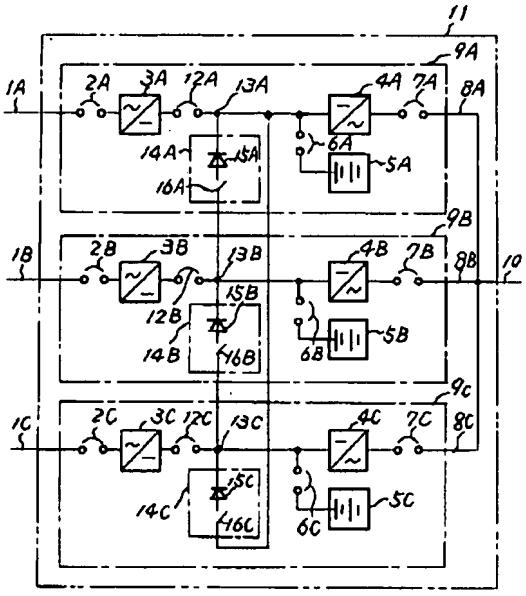
8,8A, and 8B and 8C... unit UPS alternating-current output
9,9A, 9B, 9C... Unit UPS

…単位ＵＰＳ　10... uninterruptible power system
1　0　alternating-current output
…無停電電源装置交流出力　11... uninterruptible power system
1　1
…無停電電源装置

１２Ａ，１２Ｂ，１２Ｃ　12A, 12B, and 12C... the electronic-power-rectifier output side switch
…順変換器出力側開閉器
１３Ａ，１３Ｂ，１３Ｃ　13A, 13B, 13C... At least each single is a direct_flowing bus part of UPS.
…各単位ＵＰＳの直流母線部
１４Ａ，１４Ｂ，１４Ｃ　14A, 14B, 14C... Direct_flowing-bus connection circuit
…直流母線間接続回路
１５Ａ，１５Ｂ，１５Ｃ　15A, 15B, and 15C... diode
…ダイオード

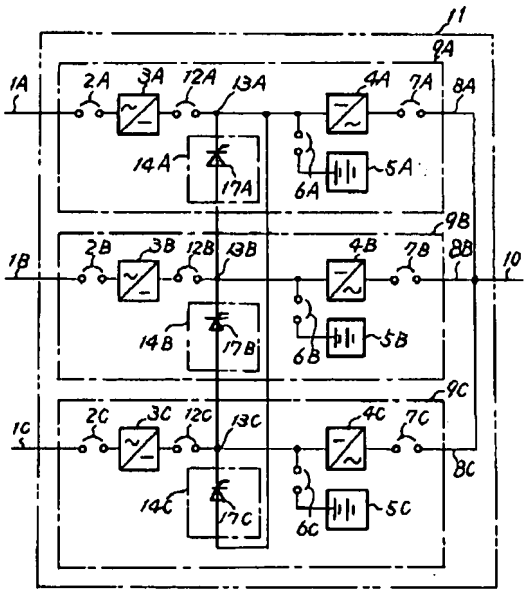
１６Ａ，１６Ｂ，１６Ｃ　16A, 16B, 16C... Direct_flowing bus indirect continued use switch
…直流母線間接続用スイッチ
１７Ａ，１７Ｂ，１７Ｃ　17A, 17B, and 17C... thyristor
…サイリスタ

【図１】　[FIG. 1]



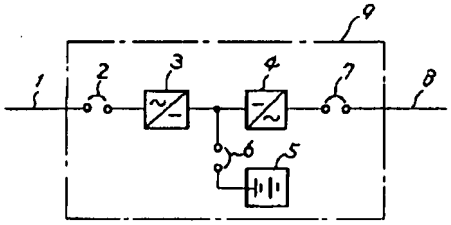
1A, 1B, 1C: AC input
2A, 2B 2C: Circuit breaker for the AC input
3A, 3B 3C: Electronic power rectifier
4A, 4B, 4C: Inverse-transformation machine
5A, 5B, 5C: Direct flow energy storage device
6A, 6B, 6C: Circuit breaker for direct inflow power
7A, 7B, 7C: Circuit breaker for an alternating-current output
8A, 8B 8C: Unit UPS alternating-current output
9A, 9B, 9C: Unit UPS
10: Uninterruptible power system alternating-current output
11: Yninterruptible power system
12A, 12B, 12C: The electronic-power-rectifier output side switch
13A, 13B, 13C: At least each single is a direct_flowing bus part of UPS
14A, 14B, 14C: Direct_flowing-bus connection circuit
15A, 15B, 15C: Diode
16A, 16B, 16C: Direct_flowing bus indirect continued use switch

【図２】 [FIG. 2]



1A, 1B, 1C: AC input
2A, 2B 2C: Circuit breaker for the AC input
3A, 3B 3C: Electronic power rectifier
4A, 4B, 4C: Inverse-transformation machine
5A, 5B, 5C: Direct flow energy storage device
6A, 6B, 6C: Circuit breaker for direct inflow power
7A, 7B, 7C: Circuit breaker for an alternating-current output
8A, 8B 8C: Unit UPS alternating-current output
9A, 9B, 9C: Unit UPS
10: Uninterruptible power system alternating-current output
11: Yninterruptible power system
12A, 12B, 12C: The electronic-power-rectifier output side switch
13A, 13B, 13C: At least each single is a direct_flowing bus part of UPS
14A, 14B, 14C: Direct_flowing-bus connection circuit
15A, 15B, 15C: Diode
17A, 17B, 17C: Thyristor

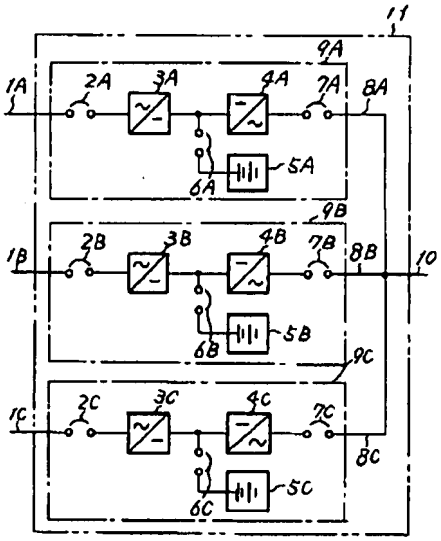
【図３】 [FIG. 3]



1: AC input
2: Circuit breaker for the AC input
3: Electronic power rectifier
4: Inverse-transformation machine
5: Direct flow energy storage device
6: Circuit breaker for direct inflow power
7: Circuit breaker for an alternating-current output
8: Unit UPS alternating-current output

9: Unit UPS

【図４】 [FIG. 4]



1A, 1B, 1C: AC input
2A, 2B 2C: Circuit breaker for the AC input
3A, 3B 3C: Electronic power rectifier
4A, 4B, 4C: Inverse-transformation machine
5A, 5B, 5C: Direct flow energy storage device
6A, 6B, 6C: Circuit breaker for direct inflow power
7A, 7B, 7C: Circuit breaker for an alternating-current output
8A, 8B 8C: Unit UPS alternating-current output
9A, 9B, 9C: Unit UPS
10: Uninterruptible power system alternating-current output
11: Yninterruptible power system

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